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INCREASED MECHANIZATION OF COAL MINING IN USSR

[Numbers in parentheses refer to appended sources.]

General Mechanization

New highly productive machinery which did not exist before World War II is being employed in mines of the Stalinugol' Combine, the largest combine in the Donbass. Heavy MV-60 and KMP-1 cutting machines make up half the stock of cutting machines. Shaker conveyers have been almost completely replaced by scraper conveyers. Almost four times as many electric locomotives are available to the mines as in 1940. More than 250 coal-mining combines, more than 400 loading machines, and more than 500 remote-control winches car feeders and other types of machinery are in use. The following table indicates the percent of mechanization of the chief phases of coal mining:(1)

Level of Mechanization in Percent (1)

	1940	Dec 48	Jun 52
Cutting and breaking up coal at face	87.7	95.6	9..0
Coal loading at face	--	0.4	31.7
Conveying coal at face,	93.2	97.9	100.
Including			
Conveying by scraper conveyer	--	26.7	87.7
Haulage	63.0	86.2	100.
Including			
Haulage by electric locomotive	52.9	68.8	97.6

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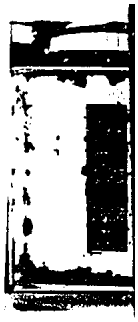


	1940	Dec 48	Jun 52
Switching operations	--	--	67.8
Coal-and rock-loading in main horizontal development workings	--	8.9	43.6
Loading coal onto railroad cars	87.8	97.7	99.7

Use of Donbass Combine

In May 1952 more than 25 percent of all coal extracted from slightly dipping or dipping seams in the Donbass was removed with the aid of Donbass combines. As a result, the level of mechanized loading at the face increased from only 0.1 percent before the war to 0.9 percent in 1948, 11.8 percent in 1949, and 22.6 percent in 1951. The increase in output and in labor productivity resulting from the introduction of the Donbass combine is indicated in the following table. (The data is based on an analysis of the work of 66 faces employing Donbass combines the first year after their introduction.)

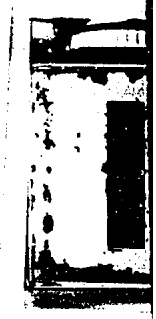
	Before Introduction of Combines	After Introduction of Combines, 1st Quarter 1950	Percent of Precombine Period
Average daily output, tons	149	163	109.3
Number of workers employed	63	56	84
Labor productivity per worker at face, tons	2.37	2.91	122.5

During the past 2 years great changes have occurred in Donbass mines. The number of combines operating in May 1952 was 35 percent higher than in May 1950. The productivity of all combines operating in Donbass mines rose from 4,417 tons in the first quarter of 1950 to 5,272 tons in the first quarter of 1952, an increase of 22 percent. During the same years the qualifications of the operators utilizing the new machine were raised and the machine itself was improved in design.

At the end of 1951 there was an investigation of 50 faces which had formerly used cutting machines and were now using Donbass combines. Of the 50, 42 were working slightly dipping seams, and eight were working dipping seams. Bituminous coal seams were being worked at 37 faces and anthracite at 13. The average length of face with combines was 134 meters; the average thickness of the seam was 1.03 meters.

In the table below figures for the precombine period are based on the monthly average for the last 3 months prior to the use of the combine, and figures for the combine period are based on the monthly average for the third quarter of 1951:

	Before Introduction of Combines	After Introduction of Combines	Percent of Precombine Period
Average output per face, tons	161	202	125.3
Number of workers employed	62	53	85.5
Labor productivity per worker at face, tons	2.59	3.81	146.8
Number of cycles per month	16	22.6	141.0
Production costs per ton of coal in relation to total wage	100	82.0	--



The increase in the coal output was as follows for 50 faces: up to 20 percent for 21 faces, 21 to 40 percent for 15 faces, 41 to 60 percent for six faces, and more than 60 percent for eight faces. The coal output increased most of all in mine faces of the Stalinugol' Combine (31.5 percent), and least of all in mine faces of the Donbassantratsit Combine (12.7 percent).

	Name of Combine				
	Stalinugol'	Artemugol'	Voroshilovgradugol'	Donbassantratsit	Rostovugol'
Average output per face, tons					
Before introduction of combines	191	156	133.5	143	155
After introduction of combines	251	195	172	161	191
Percent of precombine period	131.5	125.0	128.8	112.7	123

If faces in dipping seams are excluded from the number of anthracite faces, the increase in output will amount to 42 percent and will be greater than the increased output for bituminous faces. The coal output from faces in slightly dipping seams, depending on their length, is shown in the following table:

	Length of Faces		
	Up to 100 Meters	101-150 Meters	More than 150 Meters
Number of faces	9	11	22
Average daily output per face, tons,			
Before introduction of combines	122	158	176
After introduction of combines	136	198	226
Percent of precombine period	111.5	125.3	128.0

The introduction of combines led to an increase in labor productivity at the face which averaged 46.8 percent. Of 50 faces converted to the use of the combine, labor productivity rose 20 percent for 11 faces, 20 to 40 percent for nine faces and 40 percent for 30 faces.

Increases in labor productivity by combines is indicated in the following table:

	Name of Combine				
	Stalinugol'	Artemugol'	Voroshilovgradugol'	Donbassantratsit	Rostovugol'
Labor productivity at face, tons					
With cutting machine	2.71	2.47	1.98	3.40	2.55
With combine	4.35	3.80	2.78	3.98	3.88
Percent of precombine period	160.5	154.0	140.5	117.0	152.0

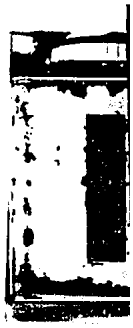
The smallest increase by the Donbassantratsit Combine is to be explained by the fact that most of the combines working there are in operation in dipping seams where the number of workers did not vary much after the introduction of the combine.(2)

A detailed analysis of work at faces provided with combines in the Stalinugol' and Chistyakovantratsit trusts (thickness of seams 0.9-1.2 meters, angle of dip 5-12 degrees, average length of face about 170 meters, face props, before introduction of combines, wood, after their introduction, metal) resulted in data given in the following table:

	Stalinugol' Trust Average for 22 Faces			Chistyakovantratsit Trust Average for 16 Faces		
		After Introduction of Combines			After Introduction of Combines	
	Using GTK-3, MV-60, and KMP-1 Cutting Machines	Total	Percent of Precombine Period	Using GKT-3, KMP-1, and MV-60 Cutting Machines	Total	Percent of Precombine Period
Level of mechanization of loading at face, percent	--	31.6	--	--	39.4	--
Depth of cut, meters	1.8	1.45	80.6	1.8	1.45	80.6
Advance per month, meters	28	36	128.5	23	38	165.
Daily output per face, tons	240	311	129.6	213	350	164.2
Number of workers at face per day	70	52	74.3	59	48	81.4
Labor productivity per worker at face, tons	2.86	5.1	175.0	3.04	6.20	202.0
Production costs per ton of coal, percent	100.	--	67.7	100.	--	75.2

Increased Productivity of Specific Donbass Mines After Introduction of Combines

Trust and Mine	Level of Mechanization of Loading at Face (%)		Avg Monthly Productivity of Faces With Combines (tons)		Avg Amt of Coal Cut per Month by Combines (tons)		Avg Monthly Productivity per Exploitation Worker, 1st Qu 52 in % of 1st Qu 50	Production Costs per Ton of Coal in 1st Qu 52 in % of 1st Qu 50
	1st Qu 50	1st Qu 52	1st Qu 50	1st Qu 52	1st Qu 50	1st Qu 52		
Stalinugol' Trust								
No 1 imeni Chelyuskintsev	32.8	73.9	5,670	7,464	17,000	41,400	116.5	95.3
Trudovskaya No 5	77.4	100.0	4,130	5,118	16,500	25,593	123.1	81.5
Budennovugol' Trust								
Novo-Mushketovo	72.5	88.0	3,570	6,583	16,800	26,300	140.3	87.5
Zuyevantratsit Trust								
No 20-20-bis	72.7	100.0	4,820	6.226	12,060	22,213	120.7	81.0
Chistyakovantratsit Trust								
Krasnaya Zvezda No 1	53.1	68.0	6,550	9,390	12.400	22,200	115.4	92.4
No 3-bis	100.0	100.0	6,780	8,546	36,700	44,165	110.5	82.2
Snezhnyanantratsit Trust								
Osnovnaya No 15	75.9	100.0	6,331	6,440	19,300	29,211	122.0	90.9 (1)



Use of Loading Machines

Loading machines have been widely introduced in coal mines of the USSR since 1947. In the last 4 years their number has increased 14 times. Rock-loading machines have increased 21 times in number and coal-loading machines eight times. At present, rock-loading machines constitute 66 percent of the entire stock of loading machines; and coal-loading machines 34 percent. More than 80 percent of all the rock-loading machines are utilized in mines of the Donbass. The entire stock of rock-loading machines, created by Soviet designers, is divided into three types: the UMP-1 (55 percent), the EMP (24 percent), and the PML-5 (21 percent).

As the number of loading machines in use has increased, there has been a sharp increase in the volume of development work with mechanized coal and rock loading. This has doubled for the coal industry as a whole and almost tripled for the Donbass, as is indicated in the following table:

	Volume of Mechanized Loading in Development Work in % of 1949		
	1949	1950	1951
In Mines of Ministry of Coal Industry	100	156	193
Donbass	100	192	292
Kuzbass	100	148	169
Moscow Basin	100	143	125
Karaganda	100	150	225

The increase in the volume of mechanized development work may also be characterized by an increase in its proportion to the total amount of main horizontal workings, as shown in the following table:

	Volume of Mechanized Development Work in % of Total Amount of Horizontal Passages Cut			
	1949	1950	1951	Mar 1952
In mines of Ministry of Coal Industry	17.1	24.6	31.6	27.3
Donbass	14.8	25.7	37.5	45.7
Kuzbass	42.7	46.3	64.6	71.5
Karaganda	17.5	27.5	38.9	42.2

Effectiveness of Various Loading Machines (3)

	UMP-1 Machine			EPM-1 Machine			PML-5 Machine		
	Manual Labor	Mechanized Labor	Percent of Manual Period	Manual Labor	Mechanized Labor	Percent of Manual Period	Manual Labor	Mechanized Labor	Percent of Manual Period
Workings cut per month, percent	100.0	147.0	--	100.0	138.5	--	100.0	155.0	--
Cross section, square meters	9.9	9.9	100.	8.2	8.2	100.	7.7	7.7	100.0
Cutting norm, linear meters	0.157	0.184	117.	0.152	0.174	114.5	0.196	0.209	107.0
Labor consumption norm per linear meter, men per shift	6.35	5.44	85.5	6.58	5.76	87.5	5.11	4.78	93.5
Actual labor productivity, linear meters	0.164	0.219	133.5	0.173	0.228	132.0	0.214	0.291	156.0
Actual labor consumption per linear meter, men per shift	6.1	4.57	75	5.80	4.38	75.5	5.09	3.61	71.0
Fulfillment of cutting norm, percent	104.5	119.0	--	113.7	131.0	--	109.1	139.3	--
Actual production costs for total wage, percent	100.	93	--	100.	94.7	--	100.0	112.	--
Including straight rates	100.	87	--	100.	89.	--	100.	91.5	--
Increases, bonuses, and other wages	100	130.5	--	100	121.7		100.	207.	--
Wage per worker, rubles	46	57.4	124.5	53	67.	126.	50.2	79.5	159.0

The following table indicates the number of days devoted to manual and mechanized loading in development work in January 1951 and March 1952.(3)

	Jan 51		Mar 52	
	Manual Loading	Mechanized Loading	Manual Loading	Mechanized Loading
In mines of Ministry of Coal Industry	21.4	23.1	21.1	25.5
Donbass	23.5	24.3	24.1	26.8
Kuzbass	17.0	21.6	16.9	24.1
Karaganda	20.4	21.1	23.1	23.1

SOURCES

1. Moscow, Mekhanizatsiya Trudoyemkykh i Tyazhelykh Rabot, No 8, 1952

2. Moscow, Ugol', No 8, 1952

3. Ibid., No 7, 1952

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